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ABSTRACT

A two-phase study assessed the extent to which a set of variables predicted rural secondary students' likelihood of continuing to college and sought to determine predictors of rural students' academic success at the completion of first-year university study. Participants were drawn from seven state coeducational secondary schools in the Riverina (Australia) region. Phase 1 gathered school achievement data from 281 rural secondary students for year 10 and year 12 and developed measures of family background, school commitment, and goal commitment from student surveys. Results indicate that although academic achievement was the most important predictor of continuation to university study, other family background and attitudinal factors were also related to this outcome. In addition, a student's future academic success was largely predictable at the end of year 10. Phase 2 monitored the first-year progress of 54 of the 125 students from phase 1 that attended college. Results indicate that although academic achievement and course satisfaction predicted a student's likelihood of passing all first-year subjects, the latter was the more important predictor. Course satisfaction stemmed from the related attitudinal measures of student identity and sense of purpose. Contains 20 references. (TD)

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Rural Students Continuing Their Studies in University Contexts

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by

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ABSTRACT

This paper reports on a longitudinal study of Riverina-based senior secondary school students who began university studies within three years of completing the NSW Higher School Certificate (HSC). Information was collected by survey instruments during Years 10 and 11, and whilst students were attending university. School records provided data on school achievement in the Year 10 Reference Tests and the HSC results in Year 12. The findings from a discriminant analysis showed that a combination of five school variables was able to accurately classify students subsequently proceeding to university. A logit analysis, based on these same students, demonstrated that two variables, namely, HSC performance and university course satisfaction/enjoyment, were significant influences on pass rate in first year tertiary study and that the latter was more important. The paper concludes with a discussion of a tentative model which describes the key factors affecting tertiary success.

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Introduction

Much has been written about the reasons students elect to continue their studies beyond high school (see e.g., de Rome & Lewin, 1984; Dobson, Sharma, & Haydon, 1996; Hayden & Carpenter, 1990; Lam, 1982); and, additionally, why these same students persist with their studies to graduation (see e.g., Chickering & Reisser, 1993; Jackson, Gardner, & Sullivan, 1993; Pascarella & Chapman, 1983, Power, 1987). Researching in an Australian context, Hayden and Carpenter (1990) reported that a combination of individual attributes and situational characteristics predicted whether or not school leavers chose to study at the tertiary level. In particular, they found that school achievement, parental encouragement, motivation, and school type were the main determinants of moving from school to higher education. There is also evidence from a Canadian study that individual and situational factors including socio-economic background, school-initiated employment experiences, and personal values all contribute to the decision to enrol in tertiary education (Lam, 1982).

Apart from concentrating on the transition from secondary school to higher education, researchers have been concerned with student persistence and success at the tertiary level. Of special significance is the corpus of work that describes the experiences of first year university students. Two Australian reports, notably Power, Robertson, and Baker (1987) and McInnis, James, and McNaught (1995), have emphasised a number of factors which relate to successful study performance, including a good background in English and Mathematics, high motivation, a supportive family environment, strong course commitment, and an academic

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application. Nevertheless, it needs highlighting that the authors of these reports have not fully explored the relationship between and among the various factors noted above. That is, they have not tried to demonstrate how individual factors or groups of factors might link to, explain, and /or predict student success.

Not surprisingly, there is a paucity of literature which specifically focuses on rural-based students who choose to enrol in university courses. The information which is available is restricted to North American studies such as Elliott (1987) and thus is not readily transferable to the Australian circumstance. Although some preliminary work has been carried out locally to consider the problems that rural-based students face in adjusting to university (Hemmings, Boylan, Hill, & Kay, 1996), no Australian study has been undertaken to: 1) isolate the factors which explain and predict continuation to university for rural-based students; and, 2) investigate the determinants of first year university success for rural-based students.

The purpose of the present study was twofold. First, rural-based students who continued their studies to university were compared with their counterparts whose short-term plans did not include university study; and second, the academic performance of the rural-based tertiary students was examined as a means of identifying predictors of academic success at the completion of first year university study.

Method

Design and Sample

The general design of the study was longitudinal with data collected during two phases. Phase 1 included the period late 1991 to early 1994 and allowed data to be gathered from Year 10 to Year 12. The second phase of the study incorporated the period 1994 to 1996 and used the responses of participants who began their tertiary studies in this time span. Participants were drawn originally from seven state co-educational secondary schools in the Riverina region and tracked until they either withdrew from school or university. At the conclusion of Phase 1 useable information was obtained from 281 participants. A sub-sample of these participants (N=125), who subsequently enrolled in university, was eligible for inclusion in the second data collection phase. As a consequence of the design set, it was possible to follow relatively large numbers of students for several years, permitting periodic assessments when, and if, required.

Instrumentation and Procedure

Two different data collection tools were used, namely, survey and a student database. Surveys were administered periodically during Years 10 and 11, and item selection was guided by previous research. These surveys sought information about demographic, situational, and attitudinal factors. Items seeking responses about the degree of family encouragement received and the sources of financial support tapped information which was used to develop a 'Family Background' (FBT) composite measure. This scale was extracted from a principal components analysis using the SPSS program titled FACTOR (SPSS, 1988). The same statistical procedure was followed to produce three more measures: 1) 'Year 10 School Achievement' (IA1) which was derived from a composite of state-wide Year 10 Reference Test results in English, Mathematics, and Science; 2) 'Goal Commitment' (GCA1) was defined by reducing three separate items dealing with aspirations and job expectations to one factor; and, 3) 'School Commitment' (SCT2) was made up of nine items concerned with school satisfaction and schooling responsibilities. These items were reduced to a two-factor structure. The criterion measure for this phase of the study was the dichotomous variable (continuation to university or non-continuation) and was labelled CONUNI. For a comprehensive discussion of the instruments used during Phase 1, readers are asked to refer to Hemmings (1994).

An additional survey instrument was developed as a means of gathering data during Phase 2. This survey was posted to 125 eligible respondents, that is, those students who enrolled in a university course during 1994-96. After a follow-up reminder, complete data were received from 54 participants, representing a 43% response rate. The key items forming this survey were all based on questions posed by McInnis et al. (1995). Three scales, labelled 'Course' (COURSE), 'Student Identity' (STUDID), and 'Sense of Purpose' (SENPURP), were derived from the items in the survey by way of a principal components analysis. The results of this particular analysis are presented in the Appendix. The criterion variable (PSRATE) was measured using a single item which distinguished between students who passed all subjects during their first year and those who failed at least one subject in the same period.

The student database was designed to monitor progress of the sample to determine which participants were available for future questioning. As well, the database was used by school principals to record both Year 10 Reference Test achievements and Year 12 HSC results (TER).

Results

Phase 1

A correlation analysis was carried out to explore the relationships between the predictor variables defined in the previous section. This analysis was performed using the SPSS program CORRELATION (SPSS, 1988) and the results are summarised in Table 1. An inspection of the Pearson product-moment correlation coefficients revealed that the direction of the measures was as anticipated but that School Commitment was poorly associated with the other predictor variables, with the exception of Goal Commitment. Interestingly, all other relationships were significant ($p<.01$).

Table 1
Correlations among the Phase 1 predictor variables

Variable	FBT	IA1	GCA1	SCT2	TER
FBT	1.00				
IA1	.31*	1.00			
GCA1	.26*	.45*	1.00		
SCT2	.00	.10	.28*	1.00	
TER	.27*	.79*	.46*	.06	1.00

* $p<.01$ (2-tailed)

In order to determine the best linear combination of variables which distinguish between students who continue to university (117 cases) and those who do not (164 cases), a discriminant analysis was performed. The discriminant function was highly significant (Wilks' lambda=.403, chi-square=251.438, df=5, $p<.0001$), and all the predictor variables, namely, Family Background, Year 10 School Achievement, Goal Commitment, School Commitment, and Year 12 (HSC) Results, met the criterion for inclusion in the function. The canonical correlation between the criterion and the set of predictors was .773. This canonical correlation indicated that almost 60% of the variance was shared by the linear combination of the five variables. Moreover, if TER were omitted from the discriminant analysis, the four remaining predictor variables still explained more than 36% of the variance in the criterion measure.

The results of the classification analysis are presented in Table 2 and show that 82.9% of the group planning to continue their studies at university were correctly classified, whereas 9.8% of the group not continuing their studies to the university level were misclassified. The percentage of 'grouped' cases that were correctly classified was 87.2%.

Table 2
Classification results for continuers and non-continuers

Actual Group	No. of cases	Predicted	
		Continuers	Non-continuers
Continuers	117	97 (82.9%)	20 (17.1%)
Non-continuers	164	16 (9.8%)	148 (90.2%)

Percentage of 'grouped' cases correctly classified: 87.2%

Phase 2

Table 3 presents the results of a correlation analysis based on the variables identified in Phase 2 of the study.[1] This analysis was performed using the SPSS program CORRELATION (SPSS, 1988). The direction of the correlations was as expected. There were significant relationships between pass rate and obtaining a good TER (r=.39) and finding satisfaction and enjoyment in a chosen course (r=.33). Course enjoyment and satisfaction was associated significantly with a strong sense of identity as a university student (r=.50) and a firm commitment to future university and related goals (r=.41). In line with predictions, TER was not significantly related to the three student attitudinal variables viz., COURSE, STUDID, and SENPURP.

Table 3
Intercorrelation matrix of Phase 2 variables

Variable	PSRATE	COURSE	STUDID	SENPURP	TER
PSRATE	1.00				
COURSE	.33*	1.00			
STUDID	.18	.50**	1.00		
SENPURP	.17	.41**	.41**	1.00	
TER	.39**	.05	.04	.14	1.00

* p<.05, ** p<.01 (2-tailed)

In order to distinguish between those students who passed all their attempted subjects during first year university, and those who failed at least one subject in the same period, a logit analysis was conducted using the SPSS program titled PROBIT (SPSS, 1988). Logit analysis is deemed the most appropriate multivariate procedure for analysing a skewed dichotomous criterion variable (Hanushek & Jackson, 1977). This feature is pertinent to the present study as the dichotomous criterion variable (PSRATE) split 68.3% and 31.7%. That

[1] In this particular analysis, the PSRATE variable was measured on a continuous scale from 0 to 1, and was defined as the number of subjects in which at least a grade of pass was obtained by the student divided by the total number of first year university subjects in which the student was enrolled. This definition is very similar to the one used by West (1985).

is, the majority of the participants passed all of their subjects. However, it is worth repeating that the number of cases used for this particular analysis was only 54.

The results of the logit analysis are presented in Table 4. In this table the regression coefficients, their standard errors, and the t-ratio values[2] are displayed. The variables which are significantly related at the five per cent level to PSRATE have been asterisked. As can be seen from this display, the pass rate was influenced significantly by two variables: HSC performance (TER) and university course satisfaction/enjoyment (COURSE).

Table 4
Logit results for pass rate

Variable	Regression Coefficient	Standard Error	t-ratio
TER	.00021	.00011	2.02295*
COURSE	.17550	.08437	2.08005*
STUDID	.10954	.10511	1.04214
SENPURP	.06372	.15348	.41516

* $p < .05$ [pseudo $R^2 = .534$]

A by-product of the logit analysis was the calculation of a statistic known as pseudo R^2. The pseudo R^2 was computed using a chi-square value. Although the pseudo R^2 statistic should not be considered in 'variance explained' terms, it does serve a useful purpose in that it shows how well a set of predictor variables relates to a criterion measure (Walsh, 1987). As highlighted in Table 4, the statistic was .534. Taken together, the four predictor variables, offered a good prediction of which students from rural backgrounds are successful in their first year university studies.

As a means of shedding further light on the nature of the relationships between and among the variables in Phase 2 of the study, path analytical procedures were adopted. Path analysis, through multiple regression techniques, can detect the indirect and direct influences of predictor variables on each other and on criterion variables (Kerlinger, 1986). The first step in the path analytical procedures was taken using the SPSS program REGRESSION (SPSS, 1988). This regression analysis, with COURSE as the criterion measure, yielded two standardised regression (beta) weights which can be considered as path coefficients (Heise, 1975). The next step following these determinations, involved the construction of a path model (see Figure 1). As can be seen in this model, both TER and COURSE have significant direct effects on PSRATE, and STUDID is impacting directly and significantly on COURSE.

[2] One-tailed values of t were used because the direction of the relationship between measures was hypothesised as yielding a positive r.
The criterion for representing a significant path coefficient was $p < .05$. Additionally, it was assumed that if the distribution of the variable PSRATE had permitted the use of a regression analysis, then the two

The other variable represented, namely, SENPURP has a substantial direct effect on COURSE ($p<.07$). Nevertheless, because these calculations were derived from a relatively small sample size (N=54), the path model depicted should be viewed as a tentative one

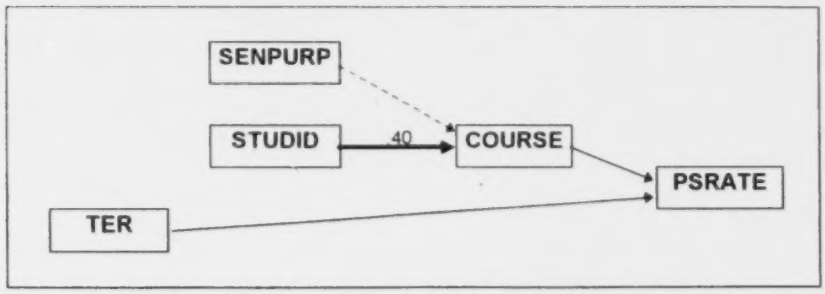

Figure 1. *Path model of first year university pass rate*

Discussion

In the first phase of this study a discriminant analysis was undertaken to assess the extent to which a set of variables, including two school achievement measures (at Year 10 and Year 12), a family background measure, and two personal measures (i.e., school commitment and goal commitment), predicted an individual's likelihood of continuing to university. As has been reported the complete set of measures significantly predicted this outcome. Certainly this result might be expected because of the importance of Year 12 school achievement as measured by the TER in determining an individual's eligibility to enter university. However, the more interesting result is that when TER was excluded from the analysis the remaining set of measures accounted for 36 percent of the variance of the criterion measure. This represents almost two thirds of the variance accounted for by the full set of predictor variables. Most of this variance seems to be accounted for by the Year 10 achievement measure, since when it is excluded from the analysis the amount of variance accounted for by the remaining variables, although still significant, drops to 15 per cent.

These results from the first phase of the study illustrate that although academic achievement variables represent the most important predictors of whether students will continue to university study, there are other family background and attitudinal factors which also are related to this outcome. Moreover, the relatively high predictive effect of Year 10 achievement indicates that academic achievement prior to the final two years provides a good indication of a student's likely future with respect to university entrance. The very high correlation between TER and Year 10 ($r=.79$) achievement demonstrates that in spite of the more flexible subject choices available in the final years of secondary schooling a student's academic success is largely predictable at the end of Year 10. Thus, for this sample of rural

betas relating to it would be significant, that is, given the significance of the two unstandardised

students academic achievement, which remained relatively stable throughout the final years of schooling, was the most important predictor of continuation to university, even though these other family and attitudinal factors were also related to this outcome.

The second phase of this study was designed to examine factors which were related to students' success in their first year of university study. The correlation analysis revealed that student success, as measured by the proportion of subjects passed, was significantly related to both TER and course satisfaction/enjoyment. However, this latter variable was also found to be significantly correlated with two other attitudinal variables, namely, student identity and sense of purpose. A subsequent logit analysis, in which the student success variable was reduced to a dichotomous measure, confirmed that only the school academic achievement measure, viz., TER, and course satisfaction/enjoyment predicted a student's likelihood of passing all their first year subjects. Moreover, a second logit model including only TER and course satisfaction showed that although both these measures were significant predictors of university success, that the latter variable was the more important predictor.

Although the other two attitudinal variables, student identity and sense of purpose, did not emerge as significant predictors in the logit model for university success, they were significantly correlated with course satisfaction. A multiple regression model predicting course satisfaction/enjoyment indicated that student identity was a significant predictor and that sense of purpose was only marginally non-significant. In view of the rather small sample employed, the possible influence of this second predictor may be worth noting (see Figure 1). The combination of these two models, that is the logit and multiple regression, indicates that there appear to be two separate sources of influence on students' success in their first year of university study. One source is the rather predictable factor of prior academic achievement and the other is the attitudinal measure of course satisfaction. This second source of influence seems to stem from a set of related attitudinal measures, namely, student identity and sense of purpose.

Despite the fact that the model depicted here is based on rather limited empirical evidence, the relationships represented are consistent with several well-established perspectives in the literature pertaining to adolescent development. For example, there is an abundance of evidence which suggests that adolescents are engaged in the formation of an identity, which includes a vocational dimension (Santrock, 1996). There is also a body of research literature which testifies to the importance of personality and interests as predictors of vocational choice (Holland, 1987). Thus, the substantial influence of course satisfaction

regression coefficients in the earlier logit analysis.

and enjoyment in this study appears to be consistent with the existing research evidence on the formation of vocational identities by adolescents.

The results relating to the influence of prior academic achievement are in many respects predictable. The measure of prior academic achievement used in this study was the TER, which was also invariably used by universities to select these students. This factor alone would lead one to predict a positive significant relationship between TER and university success. However, in this study course satisfaction/enjoyment was found to have a greater influence on the dichotomous measure of student success at university. The apparent lesser influence of TER may be caused by the rather truncated range of TER scores within the sample. Thus, although the evidence from this study supports a model of dual influence, that is course satisfaction/enjoyment and prior academic achievement on first year university success, it would be presumptuous to draw definite conclusions about the relative influence of these two factors. Further study of larger samples of students, possibly extending beyond the first year of university, would be required to make comparisons of this kind.

APPENDIX

Table 5
Results of the principal components analysis

Factor	Variable Label	Factor Loading	Total per cent of shared variance
COURSE	ENJOY	.90	75.1
	STIM	.87	
	UNISAT	.82	
STUDID	LIKE	.69	66.5
	ATMOS	.82	
	SUITS	.85	
	EXPEC	.76	
SENPURP	REASON	.86	72.6
	LIFEGO	.89	
	FUTURE	.82	

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